3d Congress, } HOUSE OF REPRESENTATIVES. { Document
2d Session. } { No. 605.

NORFOLK HARBOR, VA., AND VICINITY.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

ITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON PRELIMINARY EXAMINATION AND SURVEY OF HARBOR AT NORFOLK AND PORTSMOUTH AND APPROACHES THERETO AND CHANNEL TO NEWPORT NEWS, VA., WITH A VIEW TO SECURING INCREASED WIDTH OF CHANNEL AND PROVIDING ADDITIONAL ANCHORAGE AREA.

NUARY 16, 1914.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

War Department,
Washington, January 15, 1914.

he Speaker of the House of Representatives.

Sir: I have the honor to transmit herewith a letter from the Acting
hief of Engineers, United States Army, dated 13th instant, to-
ether with copies of reports from Lieut. Col. E. E. Winslow, Corps
Engineers, dated May 28 and December 15, 1913, with map, on
eliminary examination and survey, respectively, of Norfolk Harbor
d vicinity, made by him in compliance with the provisions of the
ver and harbor act approved March 4, 1913.

Very respectfully,

Lindley M. Garrison,
Secretary of War.

War Department,
Office of the Chief of Engineers,
Washington, January 13, 1914.

rom: The Chief of Engineers, United States Army.
: The Secretary of War.
bject: Preliminary examination of Norfolk Harbor and vicinity.

1. There are submitted herewith, for transmission to Congress,
ports dated May 28 and December 15, 1913, with map, by Lieut.

Col. E. Eveleth Winslow, Corps of Engineers, on preliminary exa
nation and survey, respectively, authorized by the following it
contained in the river and harbor act approved March 4, 1913:

> Harbor at Norfolk and Portsmouth, and approaches thereto, and channel to N
> port News, Virginia, with a view to securing increased width of channel and provid
> additional anchorage area.

2. The existing projects for improvement of these localities w
adopted by the river and harbor act approved June 25, 1910. T
district officer considers the several localities under their proj
designations, as follows:

THIMBLE SHOAL CHANNEL.

3. This channel, which connects the deep water of Hampton Roa
with the ocean, will have a depth of 35 feet at mean low water, a
will be nowhere less than 500 feet in width when completed. T
district officer reports that it would appear, for the present at lea
that the projected width of this channel is sufficient.

CHANNEL TO NEWPORT NEWS.

4. This channel was completed over a year ago to its project dep
of 35 feet and width of 400 feet. On account of its distance fr
the shore, the impracticability of establishing ranges, and the di
culty of keeping the sides of the channel accurately marked by reas
of the effect of cross currents on the buoys, he is of opinion that t
channel should be widened to 600 feet, at an estimated cost of $270,0
the cost of maintenance being the same as at present, $15,000 p
annum.

NORFOLK CHANNEL.

5. The Norfolk Channel extends from deep water in Hampt
Roads up the main portion of the Elizabeth River to the junction
its branches and thence up the Southern Branch to above the Norfo
Navy Yard. The present channel, completed about a year ago, h
a depth of 35 feet at mean low water and a width of 400 feet.
addition to carrying an annual commerce estimated at abo
22,000,000 tons, this channel is traversed by naval vessels, includi
the largest colliers and battleships. The district officer is of opini
that the Norfolk Channel requires widening, and he recommends th
its width be increased to 600 feet as far up as the mouth of the Sou
ern Branch, thence 450 feet wide up the Southern Branch as far
the lower end of the navy yard, 600 feet wide along part of the nav
yard front, and 800 feet wide along the upper end of the navy-ya
front, as far as the Belt Line Bridge. The estimated cost of t
work is $840,000, of which $130,000 is on hand, leaving $710,0
additional to be provided; the estimated cost of maintenance
$15,000 per annum.

ANCHORAGES.

6. The district officer states that the anchorages along the Norfo
Channel are restricted in area and are frequently congested. He
of opinion that additional anchorage space is required, and that f
economy anchorages of different depths should be provided for d
ferent classes of vessels. For large vessels he proposes an anchora

of 64 acres 35 feet deep northwestward from Lamberts Point, at an estimated cost of $99,000. Southward of and adjoining the above is an anchorage of 62 acres, having a low-water depth of 24 feet or more. For small barges and canal boats bound to or from the waterway southward for Norfolk, he proposes an anchorage of 45 acres 12 feet deep westward of the main channel and between the Western Branch and Pinners Point, at an estimated cost of $35,000. He believes that it is advisable for the United States to undertake he construction of these anchorages on condition that the locality r the interests affected will provide and maintain such mooring buoys or other facilities for anchoring vessels as the Secretary of War may consider just and proper.

7. These reports have been referred as required by law to the Board f Engineers for Rivers and Harbors, and attention is invited to its report herewith, dated December 30, 1913. The board is of opinion hat it is advisable for the United States to undertake the improvements recommended by the district officer, but it does not concur with is recommendations regarding local cooperation for the anchorage rounds. It recommends that proper legislation be enacted making the duty of the Secretary of War to set aside suitable anchorage paces in navigable waters of the United States, whenever in his pinion such may be necessary, and to promulgate regulations for he use of such grounds which shall have the force of law.

8. After due consideration of the above-mentioned reports, I concur in general with the views of the district officer and the Board Engineers for Rivers and Harbors, and therefore report that the urther improvement of Norfolk Harbor and vicinity is deemed dvisable to the extent proposed by the district officer, as follows:

Widening Newport News Channel to 600 feet	$270,000
Widening Norfolk Channel	840,000
For 35-foot anchorage opposite Lamberts Point	99,000
For 12-foot anchorage near Pinners Point	35,000
Total	1,244,000

While the above estimate covers the widening of the lower part of the Southern Branch to 450 feet only, it is believed that the project idth should be 600 feet, as recommended by the board, to meet ossible future necessities. The sum of $130,000 being on hand for mprovement of the Norfolk Channel, the further sum required for e widening of this channel is $710,000. The estimate for maintenance of the Newport News Channel and of the Norfolk Channel is 5,000 each. The first appropriation should be $400,000, and subsequent appropriations made with a view to completion of the work three years. Concurring with the views of the Board of Engineers r Rivers and Harbors, I recommend the enactment of proper legislation making it the duty of the Secretary of War to set aside suitable chorage spaces in navigable waters of the United States, whenever his opinion such may be necessary, and to promulgate regulations the use of such grounds.

Edw. Burr,
Colonel, Corps of Engineers,
Acting Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBOR ON SURVEY.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
December 30, 1913.

To the Chief of Engineers, United States Army:

1. This is a report covering preliminary examination and surve of "Harbor at Norfolk and Portsmouth, and approaches theret and channel to Newport News, Virginia, with a view to securin increased width of channel and providing additional anchorag area." This locality has been under improvement for a number years, and the present inquiry appears to be for the purpose of d termining what additional facilities, if any, are advisable in Thimb Shoal Channel, the channel leading to Newport News, the ma channel leading to Norfolk, and the anchorages in the vicinity of No folk. Investigations in connection with the preliminary examin tion indicated the advisability of some further improvement, and survey was authorized and has been made.

THIMBLE SHOAL.

2. This shoal separates the deep water of Hampton Roads fro the deep water of Chesapeake Bay in the vicinity of Cape Henr Until comparatively recent years, it was not necessary to do a work at this locality, but with the increased size and draft of vesse additional depth became essential, and a project was adopted by t act of June 25, 1910, which provided for a channel 35 feet deep a 500 feet wide. Work under this project is now nearing completio Although the full projected width of the channel has not yet be made available, no difficulty appears to have been experienced vessels navigating this channel, so for the present there appears be no necessity for additional improvement.

CHANNEL TO NEWPORT NEWS.

3. At Newport News there are large and important industri which, with railroad transfers, have created a tonnage amounti in 1912 to more than 6,000,000 tons. There is sufficient depth the approach to Newport News, excepting at the Newport News B where, under a project adopted June 13, 1902, a channel 30 feet de and 500 feet wide to the south of the Middle Ground was provide This channel being found inadequate, a further investigation w authorized by the act of 1909, which resulted in the adoption of project by the act of June 25, 1910, which provided for a channel feet deep and 400 feet wide, to the north of the Middle Ground Ligh house, at an estimated cost of $465,000. Work under this proj was completed in August, 1912, the full project dimensions havi been obtained. This channel is located some distance from t shore and is subject to cross currents and winds, which at times ma it difficult to navigate, and increased width appears desirable. T district officer believes the width should be increased to 600 fe and he estimates the work will cost $270,000. The estimate f maintenance is the same as for the present channel, namely, $15,0 per annum.

NORFOLK CHANNEL.

4. This channel, which leads from deep water in Hampton Roads p to the municipalities of Norfolk, Portsmouth, Berkley, etc., and o the United States navy yard on the Southern Branch of Elizabeth River, has been improved under projects which have provided sucessively for depths of 25, 28, 30, and 35 feet. The present project rovides for a main channel up to the navy yard 35 feet deep at mean low water and 400 feet wide, at an estimated cost of $800,000. This project was adopted by the act of June 25, 1910, and was completed in December, 1912.

5. The importance of this harbor is shown by the statistics given within, which indicate a total tonnage of about 22,000,000 tons, with a value of $1,600,000,000. The district officer states that an dea of the number of vessels navigating this channel may be had from the large amount of commerce carried, and that it is a very frequent sight to see four vessels going in one direction or the other ractically abreast in the channel. There have been a number of ollisions in recent years due, it is stated, to inadequate width. To andle this great commerce safely, as well as to provide for the needs f the navy yard, he believes the width of this channel should be ncreased. He proposes a width of 600 feet in the entrance channel p to the mouth of the Southern Branch, at an estimated cost of bout $560,000. In the Southern Branch, up to the lower part of he navy yard, it is impracticable to secure a width of 600 feet, and width of 450 feet is recommended for this part of the channel. Along the lower part of the navy yard the width proposed is 600 feet, he same as below the mouth of the Southern Branch, while near the pper end of the navy yard it is practicable to secure a greater width, and as this is desired by the Navy Department for the proper andling of the large modern war vessels, it is proposed to increase he width here to 800 feet. This widening of the Southern Branch s estimated to cost about $280,000, which makes the total estimate or widening the Norfolk Channel $840,000. The district officer tates that if the sum of $130,000 left in hand from the dredging of he 400-foot channel may be applied to the present recommended work, the additional funds required will amount to $710,000. The stimate for maintenance is $15,000 annually.

ANCHORAGES.

6. With the increasing number of vessels frequenting this port, dditional anchorage areas are necessary. At the present time the ollowing localities are used for this purpose: Hampton Roads, the ames River opposite Newport News, the southwest side of the hannel opposite Lamberts Point, the east side of the channel between Lamberts Point and Norfolk, and the sides of the channel nearer the enter of the harbor.

7. The first two named anchorages are ample for all demands made pon them, but those in and about the Norfolk Channel are frequently ongested, causing vessels at times to anchor so close to the channel hat strong cross winds swing them out into the navigable channel, ndangering both those and passing vessels, resulting not infrequently in collisions.

8. It is proposed to provide an anchorage of about 64 acres, with a epth of 35 feet, west of the main channel opposite Lamberts Point

for the large vessels, which frequently load to a depth of 33 feet or more. This anchorage is estimated to cost $99,000. Just south of this site there is an area available for anchorage having a depth of 24 to 30 feet or more. This anchorage, with the one just described above, is deemed sufficient at present to supply the needs of the larger vessels.

9. There is another class of vessels, however, composed of barges and canal boats which use the waterways to the southward, which require a suitable anchorage ground. These vessels now anchor along the sides of a portion of the main channel of Norfolk Harbor The district officer states that the number of this class of vessels is increasing and it is imperative that additional anchorage be provided. He proposes for this purpose an anchorage about 12 feet in depth, covering an area of about 45 acres, just south of the mouth of the Western Branch. This is estimated to cost $35,000. This makes the total cost of the work now proposed $1,244,000.

10. The district officer describes the difficulties experienced under existing laws and regulations in controlling the anchorage areas, and he recommends legislation which would authorize some official of the United States to designate certain localities as anchorage ground and prescribe proper control thereof. On account of the great number of vessels and the limited area for anchorage, the district officer believes that provision should be made for mooring vessels both ahead and astern, with a view to economy of space. He believes that the necessary buoys should properly be provided either by the community or the special interests affected, and he recommends that the expenditure of any appropriation that may be made for anchorages be contingent upon the locality or other interests providing and maintaining in all of the anchorages such mooring buoys or other facilities for anchoring vessels as the Secretary of War may consider just and proper.

11. It appears from all information now available that the present channels in and about Norfolk Harbor and up to Newport News are inadequate for the present commerce, which is very large; that the size and draft, as well as number, of vessels using these waters are increasing; and that the anchorage areas are also insufficient. The plans of improvement proposed by the district officer for meeting the demands of commerce and navigation are considered conservative, and the cost not unreasonable, but as far as the channel in the lower part of the Southern Branch is concerned, the board believes that a channel 600 feet in width may ultimately become necessary to accommodate the navigation of the port, and therefore recommends that the project width be considered as of that dimension, but that the work to be done at present be that recommended by the district officer. The board concurs with him in believing that additional improvement is advisable, and it recommends the following, in accordance with the plans proposed by the district officer and shown on the accompanying map:

Widening Newport News Channel to 600 feet................	$270,000
Widening Norfolk Channel, as given above..................	840,000
For increased deep anchorage opposite Lamberts Point.......	99,000
For 12-foot anchorage near Pinners Point....................	35,000
Total..	1,244,000

The estimate for the maintenance of the Newport News Channel $15,000 and for the Norfolk Channel $15,000. The amount re- ired to be appropriated for widening the Norfolk Channel may be luced to $710,000 by using an available balance of $130,000 under e existing project.

12. If the project is adopted by Congress, the work should be prose- ted under a first appropriation of $400,000, with a view to its com- tion in three years.

13. The board does not concur with the recommendations of the strict officer regarding local cooperation for the anchorage grounds. recommends that proper legislation be enacted making it the duty the Secretary of War to set aside suitable anchorage spaces in vigable waters of the United States whenever in his opinion such y be necessary, and to promulgate regulations for the use of such ounds which shall have the force of law. The act should prescribe table penalties for the disregard of regulations so promulgated. e enforcement of such regulations should be made the duty of the retary of War, acting through the local district Engineer officers, t in his discretion the Secretary of War should have power, with the ent of the Secretary of the Treasury, to delegate such authority the local representative of the United States Revenue-Cutter rvice.

14. In compliance with law, the board reports that there are no estions of terminal facilities, water power, or other subjects so ated to the project proposed that they may be coordinated there- th to lessen the cost and compensate the Government for ex- nditures made in the interests of navigation.

For the board:

W. M. Black,
Colonel, Corps of Engineers,
Senior Member of the Board.

ELIMINARY EXAMINATION OF NORFOLK HARBOR AND VICINITY.

War Department,
Engineer Office, United States Army,
Norfolk, Va., May 28, 1913.

om: The district engineer officer.
: The Chief of Engineers, United States Army
(Through the division engineer).
bject: Preliminary examination, harbor at Norfolk, Va., and vicinity.

1. The river and harbor act approved March 4, 1913, provides for examination of harbor at Norfolk and Portsmouth, and approaches reto, and channel to Newport News, Va., with a view to securing reased width of channel and providing additional anchorage area.

2. Under appropriations worded essentially like the above, work been in progress in several places in the vicinity of Norfolk rbor; but of these, one at least, the channel to Newport News, has immediate connection with Norfolk Harbor, though, like the rfolk Harbor Channel, it is a tributary to Hampton Roads.

3. Hampton Roads is the name applied to the arm of Chesapeak Bay tributary to this bay at the southwest corner. It include besides a large area of comparatively shallow water, several squa miles of deep water, while the entrance channel connecting the roa with the bay is more than a mile wide and from 50 to 100 feet dee On account of its comparatively sheltered location and the goo holding bottom, Hampton Roads has long been famous as an ancho age, and it is not an unusual sight to see more than 100 vesse anchored therein, and it is on record that more than 300 ships we anchored in the roads at one time.

4. The locality is shown on Coast Survey chart 1222 (new serie on the Norfolk quadrangle of the Geological Survey maps and on th accompanying tracing.[1]

5. Besides a number of creeks, which it is unnecessary to nam there are three large rivers tributary to Hampton Roads, all of the under improvement by the United States: James River, enterin from the northwest, Nansemond River from the southwest, and th Elizabeth River from the southeast. On the left bank of the Jam at its mouth is situated Newport News, while the Elizabeth Riv and the lower part of its three main branches comprise what is know as Norfolk Harbor.

6. The tributaries of Hampton Roads, other than the James Rive are not subject to freshets, and the freshets in the James Rive though of considerable importance in the upper river, are noticeab at Hampton Roads only by the discoloration of the water and slight acceleration of the ebb current. The average range of th tidal oscillation in Hampton Roads and the channels now under co sideration is about 2.5 feet.

THIMBLE SHOAL.

7. Although, as stated above, the entrance channel to Hampto Roads is exceedingly deep, this depth can not be carried all the wa to the ocean, as there is in the southern part of Chesapeake Bay large area of shoal water, known as Thimble Shoal, separating th deep water west of it that leads to Hampton Roads from the dee water to the east extending out past Cape Henry to the Atlant Ocean.

8. Until in the comparatively recent past Thimble Shoal has bee no obstruction to navigation, as over this shoal there was a broa channel not less than a mile wide and having nowhere less than 3 feet of water on it, but though 31 feet of water could be carried ov this shoal, its eastern and western slopes were so flat that the distan between 36-foot contours to the east and west exceeded 4 miles.

9. Until there was taken up the question of deepening the channe tributary to Hampton Roads to depths exceeding 30 feet, there wa no reason for doing any work at Thimble Shoal, as any vessel tha could pass through the channels tributary to Hampton Roads cou pass without difficulty through the Thimble Shoal Channel; but b the river and harbor act of March 3, 1909, examinations were ordere with a view to obtaining a depth of 35 feet in the channels both t Norfolk Harbor and to Newport News, and in the provision for th

---

[1] Not printed.

orfolk Harbor Channel it was directed that the examination include the approaches thereto," which of course covered the channel across himble Shoal.

10. The report on the examination mentioned was published in [ouse Document No. 551, Sixty-first Congress, second session, and commended the excavation of a channel through Thimble Shoal) a depth of 35 feet at mean low water and a width of 500 feet, at a ost estimated at $660,000. This project was adopted by the river nd harbor act of June 25, 1910, and has never been modified. Uner appropriations made in said act of 1910 and subsequent acts work as been in progerss on the project, a contract having been entered ito under date of September 29, 1910.

11. Work on the contract mentioned expired a few months ago nd resulted in a material deepening of the channel, and except for a w lumps where the available depth is a few inches less, there now kists through Thimble Shoal a channel of a project depth, but it is uite narrow. However, throughout the entire area of the project iannel the depths now available exceed those previously existing. ince the expiration of the contract mentioned, a new contract has een entered into, work under which will shortly be begun, and is xpected to be completed during the next fiscal year. It should sult in the completion of the project.

12. The original estimate of cost was based upon data derived om the Coast and Geodetic Survey charts, and the actual depths ere found to be slightly more favorable than was shown on those iarts. Furthermore, the contract price was less than had been esmated, so that it now appears probable that the project will be ompleted at a cost of about 60 per cent of that originally estimated.

13. Thimble Shoal Channel lies between Hampton Roads and the cean, and consequently all of the ocean commerce of the tributaries Hampton Roads passes over this channel, and the amount of this ommerce can be approximately estimated by summing the commeral statistics which follow for the Newport News Channel and for the orfolk Channel.

THE CHANNEL TO NEWPORT NEWS.

14. Newport News Point is the name of the point or cape on the ft or north bank of the James River at its mouth. Up to about) years ago this vicinity was thinly settled and was devoted to rming, but the completion of the Chesapeake & Ohio Railroad and ie construction of its terminals at this point, and the establishment iortly afterwards of the shipbuilding plant of the Newport News hipbuilding & Dry Dock Co. have caused the growth here of a ourishing city of more than 20,000 people.

15. Originally there were between the deep water in Hampton oads and the James River two channels separated by a much shalwer area known as "Middle Ground," and on which many years ago ie Lighthouse Bureau built the Middle Ground Lighthouse. South the Middle Ground there was a long curved channel available at w water for vessels of 25-foot draft, while the channel north of the iddle Ground, though much shorter, could not be used by vessels rawing more than 18 feet.

16. Under the provision of the river and harbor act of March 3 1899, an examination was directed of these channels across th Middle Ground in Hampton Roads with a view to securing a dept of 30 feet. The report thereon was printed in House Document 93 Fifty-sixth Congress, first session, and was subsequently incorporate in the Annual Report of the Chief of Engineers for 1900, page 1785 A survey had been made of both channels across the Middle Groun and the south channel was selected for improvement, for, thoug longer, it required less excavation to obtain the depth under consideration—30 feet. The estimated cost of securing a channel 50 feet wide and 30 feet deep at mean low water was $225,000.

17. This project was formally adopted by the act of June 13, 1902 which appropriated $225,000, the estimated cost of the work, and th expenditure of the sum resulted in the completion of the project b February, 1905. Subsequently, as was to be expected, some slight deterioration took place in the channel and in the next few year about $12,500 was expended in maintenance.

18. Under a provision in the river and harbor act of March 3, 1909 a new examination and survey of this vicinity was made with a view to obtaining a depth of 35 feet from the deep water in Hampto Roads to the James River and the town of Newport News. Th report on this examination and survey was published in House Document 550, Sixty-first Congress, second session. This report gav consideration to the question of the relative advantages of the enlargement of the south channel, which had been previously dug to 30 fee in depth, and the excavation of a new channel north of the Middl Ground, which, though the available depth was much less than ha originally been found in the south channel, was nevertheless muc shorter between 35-foot contours. As a result of this consideratio it was recommended that the south channel be abandoned and that there be excavated north of the Middle Ground Lighthouse a new channel 35 feet in depth and 400 feet in width, at an estimated cost of $465,000. The annual maintenance cost was estimated at about $15,000.

19. This project was formally adopted by the river and harbor act of June 25, 1910, and has not been modified since that date. Unde the appropriations made in that and subsequent acts, work has been in progress and was completed in August, 1912, the full project dimensions having been obtained at that time.

20. An examination made in May, 1913, indicates that on th whole the channel has stood very well, although there seems to b slight tendencies in places for the banks to slip in, as was to b expected. Maintenance work will be necessary from time to time.

21. At Newport News the Chesapeake & Ohio Railroad has larg and comprehensive terminals, consisting of a total of about 12 docks, including a passenger dock and three large coal piers, having mechanical handling apparatus, two grain elevators with mechanical transporters, and a number of warehouse docks.

22. Next to the Chesapeake & Ohio Railroad, the industry of largest importance at Newport News is the shipbuilding yard, engaged in the construction of both merchant and naval vessels. Of about 40 battleships and armored cruisers now in the Navy, 10 wer built at the Newport News shipyard, and there are now under construction at this yard the battleships *Texas* and *Pennsylvania*, th

ter the largest battleship yet designed. There are in addition a
mber of merchant ships now building, and during the year 1912,
7 vessels arrived at this shipyard for repairs.

23. The water terminals at Newport News, in addition to those
ntioned as pertaining to railroads and shipyards, are quite limited,
sisting of only the few wharves necessary for the local trade of
s city, but limited as they are they appear to be about adequate
the purpose. All of these wharves are privately owned.

24. The freight traffic of the Newport News channels amounted in
10 to 5,764,610 tons, and in 1911 to 6,307,501 tons. Complete
tistics for the calendar year of 1912 are as yet not available, but
total is not expected to differ greatly from that of 1911. Of the
nage above mentioned, about three-fourths consists of coal
pped by the Chesapeake & Ohio Coal Co., the remainder consisting
miscellaneous cargo.

25. The Newport News Channel is located far from the shore, and
sels navigating it are exposed at times to cross winds or to cross
rents. In order that these cross currents may not carry the
ys, placed by the Lighthouse Bureau to mark the sides of the
nnel, too far beyond the limits of the channel, and thus be mis-
ding to vessels, it has been found necessary to anchor them some
tance inside of the channel, and when the cross currents move
m toward the channel, there is left outside the buoys some of the
igable channel. As a result, the available width of the channel
during times of cross currents, reduced below the actual width,
ich makes it very awkward when deep draft ships have to pass
h other. Under the circumstances, the existing channel, 400 feet
le, appears to be too narrow, and it is believed that a moderate
rease in the width is justified by the extent of the commerce
ntioned above and by the needs of the deep-draft naval or
rchant vessels which find it necessary to go to and from the
yard.

NORFOLK CHANNEL.

6. On the banks of the Elizabeth River and separated from one
ther by this river and its three main branches are situated a
nber of municipalities—Norfolk, Portsmouth, Berkeley, etc.—
ing a combined population of about 125,000. For commercial
poses, all these settlements may be considered as constituting
"Port of Norfolk," while the main part of the Elizabeth River
the lower portions of its Eastern, Southern, and Western branches
n what is called "Norfolk Harbor."

7. The harbor at Norfolk has been under improvement by the
ited States for many years, prior to the beginning of which improve-
nt the harbor had been navigable by vessels of 20 feet draft as
as the navy yard in the Southern Branch. The original project
improvement was adopted in 1878 and has been revised or
ended several times since, the main channel being successively
pened to 25, 28, 30, and eventually to 35 feet.

8. The last examination and survey of this harbor was made in
ordance with a provision in the river and harbor act of March 3,
9, the report on which was published in House Document 551,
ty-first Congress, second session. The report recommended for
folk Harbor a main channel up to above the navy yard, 35 feet

deep at mean low water and 400 feet wide, the estimated cost bein
$800,000, and the estimated cost of annual maintenance $40,00
This project was formally adopted by the act of June 25, 1910, an
under appropriation made in that and subsequent acts work h
been in progress and resulted in the completion of the project i
December, 1912, at a cost somewhat less than had been estimated.

29. In the different branches of the harbor minor channels
lesser depth have been provided, a description of which is not esse
tial to the present discussion.

30. Norfolk is the eastern or northeastern terminus of six larg
railroad systems radiating to the south and west, namely, the No
folk Southern, Seaboard Air Line, Atlantic Coast Line, Souther
Norfolk & Western, and the Virginian. In addition, by means
a car transfer to Cape Charles City, Va., on the other side of Che
apeake Bay, there is a rail connection northward with the Pen
sylvania Railroad system, and by a similar transfer across Hampto
Roads to Newport News, connection is made with the northwest b
the Chesapeake & Ohio system.

31. Norfolk is the southern terminus of a large number of stea
boat lines, giving connection to northern cities, such as Washingto
Baltimore, Philadelphia, New York, Providence, and Boston, a
there is, in addition, a large amount of coastwise freight shippe
to northern ports in sailing vessels or barges. As yet Norfolk is n
the terminus of any regularly established trans-Atlantic line, thoug
it is a frequent port of call for foreign vessels coming in to obta
bunker coal.

32. In addition, Norfolk is the terminus of a large number
local steamboat lines, running to towns and landings on the vario
rivers and creeks in southeastern Virginia and northeastern Nor
Carolina. Much freight, in addition, is brought to Norfolk in schoo
ers and power boats from the localities just mentioned.

33. Norfolk lies at the north end of an important section of t
proposed intracoastal waterway, namely, the section from Norfo
to Beaufort. This part of the waterway is now and has been f
many years actually open to commerce and is available for vesse
of about 9 feet draft, and by the act of July 21, 1912, Congre
adopted a project for increasing the available depth of this waterwa
to 12 feet.

34. There results from the above-described condition a large a
steadily growing commerce. This commerce amounted to less tha
2,000,000 tons in 1888, 5,000,000 in 1900, 12,000,000 in 191
while for the calendar year 1911 it amounted to about 16,000,0
tons. Complete statistics for the calendar year 1912 have not
yet been obtained, but from the data submitted it is evident th
the final compilation will show a total for the Norfolk Harbor chann
exceeding 17,000,000 tons of freight, having a value of abo
$1,300,000,000. Of the total, the item of coal amounts to abo
7,000,000 tons.

35. The total above does not include the large amount of freig
carried by ships which come to Norfolk for bunker coal. Prior
September, 1912, no statistics of the freight carried by these shi
have been available, and in consequence this item of commerce h
never been included in the total. Statistics are available for t
six months from September, 1912, to March, 1913, a total of t

ight so carried exceeding 2,400,000 tons of freight, having a value about $130,000,000. All of the freight of these "bunker" ships sses at least twice through the harbor at Norfolk, and, as shown the six months' report mentioned, it probably amounts annually about 4,800,000 tons, having a value of about $260,000,000.

36. Nor does the total given include a very large amount of freight rtaining to the inland water routes which passes through the rbor at Norfolk but does not stop there, and, therefore, is not cluded in the figures above. Taking all of these items into account, would appear that the total commerce of Norfolk Harbor for the ar 1912 exceeded a total of 22,000,000 tons, and a value of ,600,000,000.

37. This total is believed to exceed that of Baltimore and to be uch greater than the commerce of any of the South Atlantic or ulf ports. Among the ocean ports of the United States, the comerce of Norfolk would appear to be exceeded by those of New ork, Philadelphia, and Boston only. It is believed that this nount of commerce is sufficient to justify the United States in aking in Norfolk Harbor all of the improvements that its business ay properly require.

38. As is shown on the tracing submitted, the terminals of the fferent railroads and steamboat lines on the shores of Norfolk arbor are widely scattered, and, when necessary, freight is transrted from one to another, either by barges and car floats or by e steamboats themselves proceeding from terminal to terminal til loaded. Such a method is neither efficient nor economical, but e scattering of the railroad terminal has the advantage of giving ilroad connection at many different points, and thus furnishing actically the entire wharf front of Norfolk with convenient railroad rvice.

39. All the docks and wharves pertaining to Norfolk Harbor are ivately owned or controlled, but the question of providing suitable iblic docks is now under consideration by a commission appointed rough the agency of the city of Norfolk. There is ample space for ch docks, but on land not now the property of the city. The only rminal facilities at Norfolk which can be considered as thoroughly equate, as up to date, and which are well fitted with mechanical pliances for freight handling, are the large coal piers of the Norfolk Western and the Virginian Railways. At a few of the other ocks mechanical appliances are used to a limited extent, but most the docks are neither modern nor well arranged, the handling of eight being done entirely by hand and small motor trucks.

40. In addition to the commercial importance of Norfolk Harbor, orfolk is of great naval importance, there being located on both les of the Southern Branch of the Elizabeth River the Norfolk Navy ard, which is the home port of a number of the largest battleships d at which shipbuilding is sometimes carried on. In connection th this report, the commandant of the navy yard was communited with and called a board of naval officers to consider what imovements the channels of Norfolk Harbor needed to fit them for e growing needs of the Navy. A copy of the report of this board s been forwarded to me and is to the effect that the following provements in the Norfolk Harbor channels are required for naval rposes: The channel in the Southern Branch from above the navy

yard to the mouth of this branch to be made as wide as the riv permits, with a turning basin near the upper end of the navy yar the channel in the Elizabeth River from the mouth of the Souther Branch to Lamberts Point to be from 900 to 1,000 feet wide an northward of Lamberts Point to be nowhere less than 1,000 feet wid Large additional anchorage areas are also considered essential.

41. The width of the 35-foot channel provided under the proje of 1910 is but 400 feet, which is less than the widths previously co sidered necessary for the channels of lesser depth. Thus the 25-foo channel of the 1890 project had a width of from 500 to 700 feet, th 28-foot channel of the 1898 project had a width of 450 feet, and th 30-foot channel of the project of 1905 had a width of 600 feet nort of Lamberts Point and a width of 800 feet between Lamberts Poi and the junction of the Eastern and Southern Branches.

42. While it is theoretically possible that in a central deeper chann excavated within the limits of a wider but shallower channel th lighter draft vessels can navigate on the shallower edges of the cha nel, leaving the deeper channel for the deeper vessels, the enforceme of such a rule is extremely difficult in practice, as in order to avoi the drag from the bottom all except the lightest draft vessels attem to keep in the deepest water available. The large extent of th commerce of Norfolk Harbor, as noted above, gives an idea of th number of vessels navigating its channel, and it is a very freque sight to see four vessels going in one direction or the other pra tically abreast in the channel. The width now provided—400 feet— is undoubtedly too small, and provision for increased widths i certain places is considered essential.

ANCHORAGE.

43. The provision in the act of March 3, 1913, under which th report is being submitted directs that there should be considered i addition to the subject of increasing the width of the existing channel that of "providing additional anchorage area." With the large num ber of vessels frequenting the port of Norfolk and Hampton Road large anchorage areas are necessary. For vessels loading in the harb and waiting wharf room, for vessels which have completed loadin and are waiting a propitious time to sail, for vessels which have take refuge in Hampton Roads and tributaries on account of unfavorabl weather at sea, and also for smaller canal boats or barges which com in small tows through the waterways from the south and are awaitin consolidation into larger tows for transportation northward, ancho age or mooring space must be provided.

44. At the present time the following localities are used as ancho ages: Hampton Roads, the James River opposite Newport New the southwest side of the channel opposite Lamberts Point, the eas side of the channel between Lamberts Point and Norfolk, and fo canal boats and small barges the sides of the channel in the center the harbor. The anchorage space in Hampton Roads and the Jame River would appear to be ample for all needs, but the anchorage mentioned in the various parts of the Norfolk Channel are frequentl congested, causing vessels to sometimes anchor so close to the chann that at times of slack water and strong cross wind they frequentl

ving out into the limits of the navigable channel, endangering both
emselves and passing vessels, with the result that collisions oc-
sionally occur. The need of additional provision for anchorage
mooring is therefore clearly evident.

CONCLUSION.

45. It is believed that the data related above in this report show
early that the commerce of the vicinity demands additional facilities,
d that the present amount of this commerce and the rate at which
is increasing are sufficient to justify moderate increases in the
idths of the main navigable channels and the provision of additional
chorage areas. The extent to which the provision of additional
cilities is justifiable is largely dependent upon the question of cost,
d such a question can only be answered by data obtained from
curate surveys. It has been the custom to make periodical surveys
the channels of this vicinity for the purpose of determining the con-
tion of the channels, the extent to which deterioration has taken
ace, and the localities at which maintenance work is necessary.
ch a survey is now in progress and will probably be shortly com-
eted. By extending the scope of this survey somewhat sufficient
ta can be obtained in a few months to show what the cost will be of
creasing the width of the different channels and of providing addi-
nal anchorage areas and the extent to which such improvements
e advisable. Authority to make such surveys and further investi-
tion is recommended.

46. No questions of water power are involved in this question, nor
far as is known at the present are there any questions of cooperation
private interests to be considered.

E. EVELETH WINSLOW,
Lieut. Col., Corps of Engineers.

[First indorsement.]

OFFICE DIVISION ENGINEER, SOUTHEASTERN DIVISION,
June 2, 1913.

the CHIEF OF ENGINEERS:

1. I concur generally with the district officer in his conclusions in
gard to the existing conditions in the harbor of Norfolk, Va.

2. I think that the Thimble Shoals Channel should gradually be
de wider. Five hundred feet is too narrow for a channel so far
m the marks and ranges which must be used to enable a vessel
follow it.

3. I think that the Newport News straight channel might perhaps
widened, although this is comparatively smooth water and a good
al nearer the guiding marks or ranges.

4. It would seem as if some arrangement might be made which
uld prevent the marking buoys from swinging out over the channel
d encroaching upon the waterway. If the water is too deep to
nt stations, I would suggest that large buoys built up on the prin-
le of a spar buoy be used, the spar going nearly down to the anchor,
that by its inclination and the known depth the exact position of
anchor might be easily estimated.

5. The channel up to Norfolk might perhaps be widened to advan-
e, but I am not so sure of that. While a great many vessels visit

the harbor of Norfolk, the number of deep draft is not and neve can be very great. Most of the business is coastwise and most c the coastwise business is carried in vessels drawing less than 20 fee The vessel must load to the depth of the port for which it is destine as well as that from which it sails. Thirty feet draft is sufficien in my judgment, to accommodate the tramp trade of the worl so that in considering the coastwise trade we could talk about channel 25 feet deep; in considering the general foreign trade, 3 feet deep, and for crippled war vessels and marine monsters we hav to have 35 feet. In making a survey I think that a study should b made of the size and number of different kinds of vessels that vis the port. It is no use to excavate channels to a depth of 35 feet i order to accommodate vessels drawing 20 feet; the comparativel rare arrival which requires this full depth can be navigated with pa ticular care and may be expected to follow a channel much narrowe

6. The same sort of information should be had, I think, in referenc to anchorages. Any little schooner which could be amply accom modated by 15 or 20 feet of water would anchor in a 40-foot basi if such a place was provided. It costs too much to do dredging t excavate extensive basins to accommodate ships at anchor. A grea many harbors have no anchorage at all and they do a large an successful business. I am inclined to think that where speciall large anchorage basins are provided it should be done by a munic pality, but I believe that an examination of Hampton Roads woul reveal large areas suitable for 20-foot anchorages, others for 25-foo and others for 30, 35, and 40 foot, and that these should be marke out and shown upon the charts and upon the water and that th harbormaster or some official should compel vessels to anchor in th least depth of water that they can safely use, thereby leaving th more restricted areas and greater depth to the large vessels. Th practicability of this, I think, should be discussed in the survey.

7. A survey is therefore recommended and the necessary allotme of money to cover the cost of the same is also recommended f approval.

Dan C. Kingman,
Colonel, Corps of Engineers.

[Third indorsement.]

Board of Engineers for Rivers and Harbors,
June 30, 1913.

To the Chief of Engineers, United States Army.

For reasons stated herein, the board concurs with the distri officer and the division engineer in recommending a survey in ord to determine the extent and advisability of the improvement. Th board also concurs with the division engineer in regard to the speci investigations suggested by him in connection with the survey, an it recommends further a study of the practicability and means regulating the use of the navigable channels so as to give deep-dra vessels the right of way in the deep-draft channels.

For the board:

W. M. Black,
Colonel, Corps of Engineers,
Senior Member of the Board.

REPORT ON SURVEY OF NORFOLK HARBOR, VA., AND VICINITY.

War Department,
Engineer Office, United States Army,
Norfolk, Va., December 15, 1913.

rom: The district engineer officer.
o: The Chief of Engineers United States Army
(Through the division engineer).
ubject: Reports on survey of harbor at Norfolk, Va., and vicinity.

1. This report on survey is submitted in compliance with depart- ient's instructions, dated July 7, 1913, and in connection with the ›port on the preliminary examination of the harbor at Norfolk and ortsmouth, and approaches thereto, and channel to Newport News, a., with a view to securing increased width of channel and providing lditional anchorage area, submitted from this office under date of ay 28, 1913. The result of the survey and the channels and anchor- ges recommended are shown on the accompanying tracing, which is ısed, as far as shore lines are concerned, upon coast survey data, ith other information obtained from recent soundings.

2. As was stated in the preliminary examination, the waterways ›vered by the above-quoted description include the Thimble Shoal ıannel, the channel to Newport News, and the main Norfolk Harbor ıannel.

THIMBLE SHOAL CHANNEL.

3. The dredging of the Thimble Shoal Channel under contract is ›w nearing completion, and when finished this channel will have a ›pth of 35 feet at mean low water, and will be nowhere less than 500 et in width, the length of the dredged channel being about 4 miles.

4. This channel is located in the south end of Chesapeake Bay, ›out 4 miles from and parallel to the south shore of the bay and, as easured in prolongation of its length, the dredged channel is more an 6 miles from the shore. Shore marks are of little value as aids the navigation of this channel, and the Lighthouse Department ıs marked it by a series of red gas buoys on one side and a series of ack can buoys on the other. Judging from experience, these aids navigation seem to be sufficient for the purpose.

5. This channel connects the deep water of Hampton Roads with e ocean, but the lighter draft vessels proceeding from Hampton oads up Chesapeake Bay do not use it. The number of vessels ıssing through the channel would appear to average about 60 per ıy—not sufficient to cause great congestion.

6. The areas to the north and south of this channel are compara- vely deep, the minimum depth within a considerable distance ing 28 feet, so that vessels proceeding through the channel, even ıen far to one side, experience no drag from the side slopes of the annel and have no tendency, therefore, to sheer off out of the annel into shoal water. Furthermore, this channel is not sub- ted very generally to bad cross currents.

7. Although the full projected width of this Thimble Shoal Chan- l has not yet been made available to its full projected depth, I ve heard of no trouble experienced by vessels getting out of the

channel and running aground, nor of any delays caused by one vess having to wait for another, so it would appear, for the present least, that the projected width of this channel is sufficient.

CHANNEL TO NEWPORT NEWS.

8. As was stated in the report on preliminary examination, th channel consists of an artificial cut connecting Hampton Roads wi the deep water of the James River north of Middle Ground Sho The original depth of the water along the line of this channel vari from about 21 to 24 feet. The material through which the chann was dug was fairly stiff and still stands up quite straight, and as result, deep-draft vessels proceeding through the channel are su jected, if they come anywhere near the side slopes, to drag from t side, which causes them to steer badly, even if it does not actual cause them to sheer out of the channel.

9. On account of its location the tidal currents do not always f low the direction of the channel and strong cross currents, especial in times of wind, are very frequent. Moreover, the channel is located that it is not possible to place range marks on shore for t aid of vessels, and reliance has to be placed on buoys along the sid of the channel, and to keep these buoys from being carried by t strong cross currents too far over the shoal sides, and thus misle vessels, it has been found necessary to place the buoys some lit distance in the channel, away from the edges of the deep water, that a portion of the deep water provided on the sides of the chan is really not available for navigation.

10. Within the past two or three months there have been no l than three occasions when deep-draft vessels have, from the caus mentioned above, run aground along the sides of this channel, th giving evident and unmistakable proof that the channel is not wi enough.

11. The channel was completed over a year ago to its full project width of 400 feet, but all of this can not be considered as availa for vessels. It is believed that the channel should be widened by least 50 per cent, giving it a width of 600 feet, of which more th 500 feet would then be always available for navigation.

12. Based upon data obtained from the survey, the widening w require the removal of about 1,375,000 cubic yards of material, a cost, including supervision and contingencies, estimated at $270,0 The expenditure of this amount is believed to be justified by t commercial importance of this channel, its annual commerce bei about 6,000,000 tons, valued at nearly $300,000,000.

13. As the deterioration of the channel will be caused probably the deposit of material brought in by the cross currents, the cost maintaining the widened channel should be no greater than of t present narrow one. This was estimated some years ago at $15,0 per annum, and no data has been collected since to show that th estimate can not be relied on.

NORFOLK CHANNEL.

14. The Norfolk channel extends from deep water in Hampt Roads up the main portion of the Elizabeth River to the junction its branches and thence up the southern branch to above the Norf Navy Yard, a total distance of about 11 miles. The present chann

mpleted about a year ago, has a depth of 35 feet at mean low water d a width of 400 feet, and was dredged for a large portion of its igth within the limits of older channels which had been dredged to ser depths but to greater widths.

15. The commerce of the main channel of Norfolk is increasing pidly, and as is shown in the preliminary report, the present annual ter-borne commerce of this harbor is estimated at about 22,000,000 ns, at a value of about $1,600,000,000. In addition to its com- rce this channel is traversed by naval vessels, including the largest liers and battleships as they go back and forth to the Norfolk vy Yard. From these figures, it is evident that this is a very busy annel, and it is a frequent sight to see as many as four vessels reast in the channel.

16. Of course, much of this water-borne commerce is carried on in nparatively light draft vessels, but there is still a large part of it rried in vessels having a draft of 30 feet or more, and as one of the st important items of the commerce of this port is coal for bunker , called for by vessels already laden to their full draft, the available pth of 35 feet is none too much.

17. Theoretically, it is, of course, possible that in a deep channel smaller and lighter draft vessels might be required to navigate ng the shallower sides of the channel, reserving the center and p part for the deep draft vessels, but it is believed that it would impossible to enforce a regulation of this character in this channel.

8. The depths of the natural bottom along the outside limits of dredged channel vary for long distances from 12 to 15 feet, and places are as little as 10 feet, and vessels drawing anything like se figures and proceeding along close to the sides of the channel l the effects of this shallow water which makes them difficult to er, and, consequently even the shallow vessels hesitate to navigate hin a reasonable limit of the sides of the dredged channel. At tain seasons of the year this channel is subject to fog, especially in early morning, at which time the night boats from Chesapeake y, running on a regular schedule in connection with trains, enter harbor. Due to the congested condition of the channel and the er facts stated above there have in the past few years been a mber of collisions, and the commerce of the harbor is increasing rapidly that it is evident that the channel should be widened.

19. As the Norfolk Channel is so closely connected with the needs the Navy, the commandant of the navy yard was consulted as to enlargement desired by the Navy Department, and a copy[1] of report of a board of naval officers called to consider the subject nclosed herewith. In this report it is recommended that—

> le in general the width of channel of 500 to 600 feet is sufficient, yet certain parts his channel should be at least 900 or 1,000 feet in width to afford opportunity to n ships around, * * *. The depth of the channel between the navy yard and Belt Line Bridge should be 35 feet, the full width of the Port Warden line, which bout 900 feet.
>
> NOTE.—The width between harbor lines at the place stated in this quotation is ually but slightly more than 800 feet.)

0. For the reasons outlined above it would appear that the rfolk Channel requires widening, and I recommend that its width far up as the mouth of the Southern Branch be made 600 feet.

---

[1] Not printed.

This will require the removal of about 2,800,000 cubic yards, at an estimated cost, including supervision and contingencies, of about $560,000.

21. The present deep-draft channel extends up the Southern Branch to the Belt Line Bridge, immediately above the Norfolk Navy Yard, but in this branch it is not practicable to continue the full channel width of 600 feet recommended for the lower part of the harbor. As far up as the navy yard, the shores of the Southern Branch are generally lined with wharves, and harbor lines were many years ago established along these shores. At the narrowest point the pierhead lines on the two sides of the river are slightly less than 600 feet apart, and for considerable distances they are but slightly farther apart. In this harbor it has, in the past, been considered unwise to dredge within 75 feet of the wharf fronts, and it would appear, therefore, undesirable that the width of channel dredged to full depth in this part of the harbor should exceed 450 feet.

22. Along the lower part of the navy-yard front, on account of the character of the sea wall of the navy yard, the full depth channel can be given a width generally of 600 feet, the same as below the mouth of the Southern Branch. Farther up in the stream, near the upper end of the navy yard the Navy desires a greater width, in order that they may be enabled to turn their large ships around. Here the harbor line on the eastern side has been thrown well back from the center of the river, and it is possible to make this portion of the channel 800 feet wide.

23. In addition to its value as the approach to the navy yard, the Southern Branch is the most important commercially of the three branches of the Elizabeth River, and for several miles above the navy yard its banks are lined with manufacturing. Furthermore it is the line of approach to the two existing waterways connecting with the sounds of North Carolina, the Dismal Swamp Canal, owned by a private corporation, and the Albemarle & Chesapeake Canal recently purchased by the United States and to be enlarged under a project already adopted by Congress. Were it not for the passage of naval vessels, there is no doubt that the present width of 400 feet would suffice for the present commercial needs, but when the fact be taken into consideration that this channel is jointly used both by commercial and naval vessels, and by the largest naval vessels afloat there is no doubt that the channel in the Southern Branch should be widened to the extent noted above.

24. The widening of the channel in the Southern Branch to 450 feet as far as the lower end of the navy yard and to 600 feet along part of the navy yard front and to 800 feet along the upper end of the navy-yard front as far as the Belt Line Bridge will require the removal of about 1,300,000 yards, at an estimated cost, including superintendence and contingencies, of about $280,000.

25. This makes the total estimated cost of widening the Norfolk Channel $840,000. From this it may be considered proper to deduct the sum of $130,000 which was saved from the appropriation for dredging the present 400-foot channel, as the actual cost of excavating this channel proved to be much less than had been estimated. This leaves the balance to be appropriated $710,000. The estimated annual cost of maintenance is $15,000.